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Faculté d'éducation

ALUMNI INVOLVEMENT IN A TECHNOLOGY PROGRAM

By

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This research paper is dedicated to the memory of my mother who would have been very proud of me.

SUMMARY

Everyone knows that in today's modern world, it is hard to keep up with the pace of the ever changing field of technology. This is no different in technology programs at the cegep level. Teachers who are employed at the cegep level find it difficult to keep up to date with the evolving industry trends, especially when working full time.

In this paper, the involvement of alumni in the program is examined. The purpose of this study is to examine five areas of alumni involvement. These five major areas of alumni involvement are advisory committees, internships, field trips, guest speaking and real life projects.

The literature is reviewed with respect to each of the described areas of involvement as well as theories of motivation. The shift of emphasis from teacher to student is discussed as well as the role of the teacher when faced with changes in technology.

Finally students and alumni are surveyed to examine their perceptions to the various types of alumni involvement in the B.S.E.T. program. This research helps to describe whether and to what degree alumni involvement benefits our students in B.S.E.T. Several variables are examined, such as: academic satisfaction and alumni involvement; graduation year and academic satisfaction; graduation year and alumni involvement. The study also examines areas such as motivational attitudes of graduates to stay involved; areas where it is crucial for alumni to stay involved; desire to partner in a capstone project and area of involvement that tends to motivate students the most and that the graduates find of utmost importance.

RÉSUMÉ

Tout le monde sait que dans le monde actuel, il est difficile d'être à jour avec la technologie qui est en constante évolution. Ceci n'est pas différent dans les programmes de technologie au cégep. Les enseignants de cégep trouvent qu'il est difficile de se garder à jour avec les tendances de l'industrie qui sont en constante évolution.

Dans cet article, afin d'aider à résoudre ce problème, l'implication des diplômés dans les programmes techniques est examinée. Le but de cette étude est d'examiner cinq domaines d'implications possibles des anciens élèves. Ces cinq principaux domaines d'implication sont les comités consultatifs, les stages, les visites en entreprise, les conférenciers et les projets en entreprise.

Les écrits sont étudiés par rapport à chacun des domaines d'implication décrits ainsi que différentes théories sur la motivation. Le changement du centre d'attention de l'enseignant envers l'élève est discuté ainsi que le rôle de l'enseignant face à l'évolution des technologies.

Enfin, élèves et anciens élèves sont interrogés pour examiner leurs perceptions quant aux différents types d'implication des diplômés dans le programme de la technologie de la mécanique du bâtiment. Cette recherche permet de décrire si et dans quelle mesure la participation des anciens profite à nos élèves actuels. Plusieurs variables sont examinées, telles que: la satisfaction scolaire et l'implication des anciens; l'année d'obtention du diplôme et la satisfaction scolaire; l'année d'obtention du diplôme et la participation des anciens élèves. L'étude examine également les sources de motivation des diplômés pour rester impliqué.

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LIST OF ABBREVIATIONS, INITIALISMS, AND ACRONYMS

UdeS	Université de Sherbrooke
B.S.E.T.	Building Systems Engineering Technology
PBL	Project based learning
HVAC	Heating, ventilation and air conditioning
MM	Metacognitive miscalibration

INTRODUCTION

The Building Systems Engineering Technology (B.S.E.T.) program is designed to provide its students with the ability to design heating, ventilation, air conditioning and refrigeration systems in buildings for the modern world. B.S.E.T. is a three year career-oriented program at Vanier College, Montreal. Most graduates from B.S.E.T. choose to go directly to the work force, however, every year some students apply to university in order to pursue an engineering degree. As is the case in most technology programs, the design methods and products used in our field are in continuous evolution. It is extremely difficult for an educator in a field dominated by technology to follow this rapidly changing environment while teaching full time. Fortunately, there is a direct link between the teachers and the industry that cannot be disregarded. In this paper we will examine the benefits of having Building Systems Engineering Technology graduates, its alumni, involved in the program.

Fall 1997 was my first semester as a B.S.E.T. student. I completed the degree in 3 years (6 semesters). During the summer separating the 4^{th} and 5^{th} semesters I worked in the field as a cost estimator for a HVAC (Heating, Ventilation and Air Conditioning) contractor. I quickly realized that some of the course content I was exposed to during my first four semesters was not currently used in the field. At that moment I decided to further my education at the engineering level. Upon graduation from university, I obtained employment as an engineer in the manufacturing sector, and was hired at Vanier College at the same time. Working in parallel as a part-time teacher and as a full time engineer was beneficial, as during these 4 years, I followed the rapidly changing pace of the industry. It is when I started teaching full time, slowly distancing myself from the industry that I realized how difficult it was to keep up with the changes and advancements omnipresent in the heating, ventilation and air

conditioning world. This is what encouraged me to look into the advantages of asking our graduates to participate in our program.

I am currently program coordinator and stage coordinator, most often when students go on stage and come back I receive positive feedback from their experience, however too frequently the students mention that some of the software we use in the B.S.E.T. program, as well as some of the curriculum, are a few steps behind. They notice this when they are exposed to the industry for the first time. This situation also occurs with part time teachers, who are intermittently exposed to the industry.

On an average, from the first year to the third we lose one quarter of the students. Student retention in our program is a challenge year after year. There are many different factors that come into play. Sometimes the students change programs, at other instances the students do not have the academic strength to pursue their studies at the college level; the responsibilities of the students outside the college can also change quickly. In certain circumstances, having the alumni present in various aspects of our program could raise the student awareness of the extraordinary opportunities that may lie ahead.

CHAPTER ONE
PROBLEM STATEMENT

Everyone knows how quickly technology can change. One day a person buys an I-Pad and the next year a newer version is available. This has an enormous impact on technology programs within educational institutions. Every year, in the field of heating, ventilation, air conditioning and refrigeration, many products, design methods, standards, codes and practices evolve. It is very difficult, but crucial, to keep up to date. Teachers, who have not followed this trend for years, or even decades, are not preparing their students for the right generation. Ideally teachers should keep one foot in the college and the other in the industry, but that is difficult for a full time teacher to do. Part time teachers have the luxury of working and teaching simultaneously and therefore have a significant advantage on this issue.

One of our responsibilities as career program educators is to prepare our students for the workforce. Students cannot be adequately prepared if they are not exposed to current codes, standards, design methods and to the newest technologies. Can students be considered successful if they maintain a good all-round average grade? Generally, this would be the assumption, but this is entirely dependent on whether or not the student was exposed to current practices. The top students will be the first ones hired, most likely at a prestigious engineering firm. If the program failed to prepare the students for the task at hand, how will the students then feel about their education, will they still consider themselves successful? Will this shatter their confidence? What happens when students become conscious that they are being exposed to out of date content while they are in school? There might be a decrease in motivation, they might decide to change programs, or they might lose faith in education. If the student was taught design methods and codes that are outdated, how will this reflect on the program itself?

It is doubtful that teachers can rely solely on literature to ensure professional development. The textbooks themselves are often one step behind. Building Systems Engineering Technology graduates – the alumni - are the link between the program and the industry and must be drawn on for the benefit of the students. Our program has the luxury of having its graduates in the industry that are not only willing but determined to help out in various ways. This paper will examine how the graduates can come into play to smooth the progress of fostering a philosophy of lifelong learning in the program. The impact this will have on student motivation and student success will be examined.

The purpose of this study is to examine five areas of alumni involvement. These five major areas of alumni involvement are advisory committees, internships, field trips, guest speaking and real life projects. In B.S.E.T. an advisory committee was formed for Building Systems Engineering Technology which is an engineering oriented program. This committee meets once a year to discuss latest trends in technology design and equipment. The committee includes all full time teachers of the B.S.E.T. department, the dean of the faculty and five to six successful engineers and technologists, employed in various fields of building systems. During the three year program, the students from B.S.E.T. generally go on 4-5 industrial site visits. In the final semester of building systems engineering technology the students follow a course in which they work on a final project and finally teachers often contact key people in the industry to give lectures on new design procedures or evolved technologies. Would it be beneficial for the students if B.S.E.T. alumni were involved in all of these areas? Does a particular area stand out more than the others? Does academic satisfaction influence the willingness of alumni to participate in such areas? These are some of the questions that will be researched.

CHAPTER TWO
CONCEPTUAL FRAMEWORK

The students in career oriented fields such as B.S.E.T. are very well aware that upon graduation the industry will be waiting for them. How can we as educators' best prepare them for the real world? The wrong answer is to stay away from the real world. We need to work hand in hand with industry to provide the students with the best preparation possible. Graduates from these technology programs are working in the real world and are ready to lend a hand. In this chapter we will examine some of the theories that throw light on what factors might lead students to be successful in academic programs particularly the technology programs.

1 THEORIES OF MOTIVATION

Theories of Motivation help us understand why, and how, alumni involvement can help both intrinsic and extrinsic motivation of students in the B.S.E.T Program. This could very well increase the students focus on learning and mastery as well as performance or grades (Pintrich and Schrauben, 1992). The students might be extrinsically motivated if they focus on the career opportunities, salaries and their first car and they might be intrinsically motivated if they focus on the concepts and the knowledge required in the workforce. There have been many studies looking at how to motivate students in technology programs (Todd and Spencer, (2005), Williams and Williams (2009), Alpay, Ahearn, Graham and Bull (2008), Williams and Williams (2005), Lamancusa, Soyster, Morell, Gensen, (2006)). Motivation for learning can often be sparked from the needs of a real project sponsored by the industry. Todd and Spencer present a design approach for a creating and industry sponsored capstone-like project. The motivation level of students from Building Systems Engineering Technology may well increase if they design a real life project.

Williams and Williams argue that making the content relevant to real life can increase a student's motivation. Alpay, Ahearn, Graham and Bull (2008) also found that students who are better engaged in real-world issues are highly motivated. Graduates from B.S.E.T. follow careers in consulting engineering, contracting and in technical sales. Teachers should be able to lean on these sectors for current content. Williams and Williams (2005) identify content as being one of the five ingredients for improving student motivation. It often takes little time for students to become aware that they are being exposed to outdated course content. This may lead to a decrease in motivation. This point is particularly important for the current generation of students who have different learning patterns and tend to be more engaged in academic tasks that they find pertinent and which can be related to the job market that they will be entering in the near future (Pintrich and Schrauben, 1992). Teachers have the responsibility of adapting the course content to what is going on beyond the school walls. The industry is ready for the students and the students want to be ready and must be prepared for the industry.

The increase in motivation will stimulate the students to work on their own. The experience the students will have gained on working on these real projects will help them develop a wider set of skills than if they were passive in their learning (Lamancusa, Soyster, Morell, Gensen, 2006). Students in career oriented programs need to be ready. They have to be taught sustainable skills as they are for the great majority headed directly to the workforce. Their educational experience must be an active one, the students need to be engaged every step of the way.

Teachers can rely in part on the industry to foster a philosophy of lifelong learning in the department. In order to keep pace with the rapid changing technological field, teachers can seek assistance from the graduates of the program, in order to progressively improve course content. This can be done through advisory committees, field trips, guest speaking, real life projects and internships. A teacher cannot keep pace with the industry relying solely on textbooks and journals. In the field of heating,

ventilation, air conditioning and refrigeration, there are simply too many advances at an excessively rapid pace.

As previously stated, the link between a technology educator and the industry can never be broken. The industry itself and its technologies constantly evolve, which obliges the educator to stay current. Furthermore, if the objective of the educator is to provide graduating students with habits of creative thinking and lifelong learning, he must constantly question his teaching and assessment methods. Why not keep in touch with the alumni who are in the industry, and request their involvement in curriculum, field trips, project base learning, advisory boards, and internships?

2 SHIFT OF EMPHASIS FROM TEACHER TO STUDENT

Until recently, teachers have always been the main focus in the classroom. In the past, teachers have basically spoon-fed the students what they needed to learn. There is a paradigm shift present, changing this focus from the teacher to the student. Lenschow (1998) illustrates the current paradigm shift in university, college and industry teaching and learning. He explains the transition between the classical behaviorist to the constructivist approach, predominantly in engineering education. Formerly, teachers told students what they had to learn. Today, lifelong learning and creative thinking need to be fostered in student engineers, as these are requirements by the industry. Rompelman (2000) says that a student that is prepared for competency development is a lifelong learner. Educational systems should include elements of this development in their curricula. Rompelman adds that before the shift, an over-emphasis on knowledge acquisition clearly lead to a strong focus on the teacher. Both Rompelman and Sparkes (1999) say that it is the desired outcome of the student that needs to be examined before the appropriate teaching methods can be chosen. Baillie and Walker (1998) consider the primary role of the technology teacher is to foster creativity in the student in order to prepare the student for an industry that is constantly changing. They have performed three case studies which clearly demonstrate the importance of providing the students all means necessary to surpass the borders of their

learning. The students must express themselves freely, which will lead to higher levels of motivation.

2.1 Role of teacher when faced with changes in technology

Technology teachers must remember the importance of staying current throughout their career. They can reach out to their graduates to see what is trending in the industry. Technology constantly evolves and the industry regularly changes therefore the technology teacher must continuously learn. A teacher approaching retirement who has been unaware of changes in the industry over his career is basically preparing the graduating student for the 70s. Lenschow (1998) states that the reason for slow progress in academia is that the teacher evaluation is done by the universities whereas student competence is tested by the industry, after graduation. He then says that the industry and universities must work in collaboration to obtain higher levels of creativity in student activity. Several short work terms should be distributed adequately in all technological academic programs. Teachers should relate these work terms to the course content as often as they can. Smith, Moores and Chang (2005) also describe the importance of keeping up to date in a technological environment. They describe metacognition as "thinking about thinking" and proceed with their definition of metacognitive miscalibration (MM) as false metacognition. They then explain the different consequences of MM, such as a negative impact on motivation and weaker overall performances. Performance can also be affected by the inability of dealing with a lack of knowledge. These same authors then provide insight on how to prepare students to learn. They first explain the importance of being aware that we can always learn something new. They then clarify that it is essential from time to time to accept the possibility that we might have learned something wrong, or that what we have learned at the time is no longer true; which emphasizes the necessity to stay current. Learning requires effort. Unlearning and relearning requires courage.

2.2 Project Based Learning

Today, engineers and technologists are expected to enter the industry with specific skills additional to solving problems with exactitude. The technology teachers are expected to help students obtain skills such as problem solving, lifelong learning and teamwork. Lenschow (1998) has researched on project based learning based upon the constructivist learning cycle created by Kolb. Studies indicate that students in higher learning do not consider lectures as the key to their gain of knowledge. The majority of their knowledge is acquired by exercises and teamwork. The point of pivot of PBL is the accurate choice of project. The project has to reflect reality and to avoid a surface approach the workload should not be excessive. Sparkes (1999) adds that Learning-centered teaching is a tactic to use the right teaching strategies to provide the students with the knowledge that they are expected to gain in their learning process. Lenschow (1998) states that in project based learning lectures are not much used in class; however they are available upon demand. This reduction in the time allocated to lectures shifts the focus from the teacher to the student's creative thinking. Students work in teams and learn about the advantages of teamwork as they learn from each other. Research has demonstrated that when project based learning is used there is an increase in the students capacity to work as a team. In PBL, higher levels of motivation are clearly discernible.

One of the most difficult skills for a technology teacher to acquire is assessing adequately. It is essential for the teacher to evaluate the competency of his students and his own teaching strategies. It would also be advantageous for technology teachers to seek criticism of their own work and review the work of others, comparing teaching methods, for example. Rompelman (2000) says that assessment is not only about marking the paper of the student; it is highly associated to the objectives in engineering education. Hargreaves (1997) adds that conventional assessment practices need to be examined. They do not encourage creativeness or depth in understanding. Constant innovation in assessment is required and is critical in obtaining the full potential of the student. Project based assessment for example reflects higher levels of motivation for

students and teachers. Students find these activities fun, thought provoking and educational. Technology teachers must constantly innovate their assessment and teaching strategies. They must obtain feedback from their peers, from their students or from the industry itself and adapt their assessment and teaching methods. This is a loop that must be repeated constantly throughout their career.

Teachers must learn to foster creative thinking in their future young engineers. The industry which is constantly evolving requires them to adapt to these changes, and stay current. The industry is also looking for employees who are able to develop their competencies and work in teams. Technology teachers must constantly evaluate their assessment techniques, by comparing with their peers or simply by inquiring the needs of the industry. When project based learning is used adequately, the students normally obtain higher levels of outcome and are highly motivated. The teachers need to bear in mind that the focus in the classroom should be kept on the students.

CHAPTER THREE
LITERATURE REVIEW

In the previous chapter theories linking class room teaching to the practical world of industry were examined. One of the main ideas was that teachers cannot rely solely on books, lectures and the school environment in order to assist students with their learning. The students must be brought outside the school walls. The students must see and experience how the theory learned in school is used in the industry. Upon graduation in an engineering-technology oriented field, the students are expected to have hands on and theoretical knowledge. Most importantly the students must be prepared to begin their careers. This chapter will now focus on the main themes that appear in the literature on the subject of providing this link between class room teaching and the practical world outside.

1 HANDS- ON LEARNING

In a book by Donald (2002) it is discussed how the students need to comprehend how the industrial milieu works and the different work habits one must obtain. Donald also explained how the "real world" can be a shock to graduating students and that more hands-on experience is required. The industry is in constant search for students who are capable of adapting to change and have strong interpersonal skills which need to be acquired beyond the classroom. Donald discussed a paradigm shift in engineering education from analytical skills to creativity. If the industry is in desire for students with such skills, their help is mandatory in terms of project assignment and curriculum. In a research article by Lamancusa, Zayas, Soyster, Morell and Jorgensen (2006) industry-partnered active learning were discussed. The authors explained the motivation behind the implementation of the learning factory, the learning factory concept and the learning factory in practice. The learning factory is a stimulating learning environment where the students develop their engineering

leadership skills by working hand in hand with the industry to solve real-world problems. The students want to do engineering. They want to have first hand experiences in contrast to having an out of date teacher read them a textbook. The research article indicated the importance of the doing in engineering. The "doing" will have a great impact on the student's retention of difficult fundamentals learning. The article discussed how the industry is constantly challenging schools to better adapt the curricula to professional practice. The Engineering curriculum is extremely demanding and, in order to be successful, students must go far beyond classroom walls. The industry should be involved in all stages of the education process. In order to ensure that learning occurs, the student must be active and set in the right environment, which will lead to greater motivation.

2 SITE VISITS

The importance of student motivation is also discussed in an article by McLoughlin (2004). Site visits can be a motivational experience in addition of being a very effective curriculum learning tool. The author discussed several items that must be considered to effectively promote a site visit which will undeniably lead to student participation and retention. In order for learning to occur, the students must be active at all stages of the trip. The students must be engaged prior to the trip, during the trip and after the trip. The author discussed how giving the students a sense of ownership prior to the trip is a good way to keep the students engaged. The author also described how teachers can build readiness which will lead excitement for the trip. McLoughlin (2004) enumerated multiple ways of engaging the students during a field trip which will enhance cognitive processing. Finally the author explained the importance of leaving some time for meta-cognitive processing of the trip itself and linking and integrating what was learned to the curriculum that will follow. Colburn (2008) on the other hand discussed site visits as informal learning and that the students learn what they choose. This is somewhat contradictory to what McLoughlin (2004) researched. A site visit must be prepared in order to reinforce curricula. The teacher can guide the

site visit in order to have the students acquire the necessary competencies required for the course.

In an article by Nabors, Edwards and Murray (2009) the results from a national survey of field trip sites were studied. Surveys were sent to 60 nationally recognized field trip sites across the USA. The authors described the great value a field trip can have for students. The authors explained how field trips strengthen the course curriculum; how they increase the students' observation skills and how they augment students' knowledge in the subject. The authors made clear the importance of connecting the field trip to current content and to choose site visits that allow the students to do hands-on activities which will involve interactive learning. The research also indicated that the students learning will be reinforced when a follow-up activity is presented to them shortly after the visit.

All authors agree that site visit planning must be done adequately. The other important factor is that the college must be ready to spend some money for both field trips and project based learning to take place. Patron, Ellis and Barrett (2009) wrote a research article that discussed virtual field trips. Virtual field trips essentially enable the students and teachers to virtually share their experiences and findings from real site visits. This would bring the necessary funding down, but again there is nothing like the real thing.

Richards and Schäefer (2007) evaluated student learning in a sustainable engineering innovation project. This project was a combination of membrane technology with renewable energy to provide water for remote communities and developing countries. Again the project brought the students far beyond the classroom walls. Thirteen students who were involved in the project who graduated as well as their peers (the industry) were surveyed to evaluate what they learned during this project. Students reported an increase in confidence which entrained better preparation for work which is in accord with what was hypothesised. The students also reported being motivated, inspired, proud and engaged, especially during site visits. One

student even reported that he felt that this project alone was of greater value to him than his entire engineering degree.

Baldock and Chanson (2006) also studied the benefits of real-world experimental projects at the University of Queensland, Australia. The project is given in an advanced fluids mechanics course which includes 15 to 35 students every year. The research article described two projects that were presented to students. One consisted of wind tunnel testing of buildings and the second wave loading on piles. These projects were designed to introduce the students to some of the numerous challenges an engineer will face in his professional life. The cognitive learning approach in both Richards and Schäefer (2007) and Lehmann, Christensen, Du and Thrane (2008) articles are described as learning being organised around problems and carried out in projects. Project based learning is a central principle that will lead to higher levels of motivation and a broader retention of subject matter.

The research clearly demonstrates the positive influence site visits and real life project based learning have on student's learning. Students who have spent some time outside the schools walls working on projects or studying existing projects will be better experienced. Their motivation level will be higher, which entrains higher levels of involvement and higher learning. Some skills cannot be taught by textbooks or cannot simply be narrated by teachers. The engineering curriculum can be reinforced with the use of PBL and field trips. Graduates will be better prepared for their future careers and will be without a doubt better appreciated by the industry.

3 TYPES OF HANDS-ON EXPERIENCE

A significant amount of research has been done in the different areas discussed (advisory boards, internships, final projects, guest speaking and field trips), however very few studies have examined the impact of having graduates involved in such areas brought up. This research paper will examine if it is beneficial to have graduates involved in each of the areas described. The paper will also do a cross examination of

these areas to see when it is of upmost importance to reach out for the contribution of our graduates. For each area of involvement, there will be a discussion of what research has been done, followed by a description of what we are currently doing in B.S.E.T. and this will help us to identify the variables that will need to be examined in the research project.

4 ALUMNI INVOLVEMENT

There are several studies in the area of alumni involvement; however too often the variable studied in regards to alumni contribution is one of a financial matter. The most valuable contribution a graduate can make is by mentoring students through internships, capstone courses or field trips or by participating on advisory boards, speaking at the college (Simon and De Haymes, 1997). The graduates from our program who currently work in the heating, ventilation and air conditioning (HVAC) field are extremely well positioned to provide insight on the program curriculum. They remember what they have learned and witness the industry's current practices; it would therefore be a grave mistake to neglect reaching out to them to seek their advice. The faculty-student relationship is unique in a program due to small class sizes and the fact that students and teachers are together for three years, when this is recognized and nurtured it will help bind alumni and program (Simon, 1997). Simon (1997) investigated the role of alumni in Social Work Education. Her research demonstrated that the primary areas of involvement were in field supervision, campus speakers and members of advisory boards. These are three of the five areas this paper will examine. A survey questionnaire was sent to all accredited baccalaureate programs listed in the Directory of Colleges and Universities. Of the 189 responding programs, 87% have a way to track their graduates. Very often students change their e-mails upon graduation, and for that reason e-mail is not the best way to keep in touch. In Building Systems we have created a Facebook page which consists of faculty, current students and past students. We use this as a portal to keep in touch with our former students for the organization of social events such as class reunions; for the posting of job offers and

for other various announcements. Towards the end of her paper she indicates the need for additional research on formal alumni participation. Here are some of the questions she states merit attention and that will be examined in this paper:

"What impact do alumni organizations have on the functioning of the program as viewed from the perspective of the students?"

"What impact do alumni organizations have on the functioning of the program as viewed from the perspective of the faculty?"

"What organizational structures or activities work best?"

4.1 Advisory Boards

Advisory boards are almost universal in engineering education programs (Genheimer and Shenab 2009). In their study Genheimer and Shenab (2009) surveyed 90 engineering school directors and advisory board members to analyse the operation and effectiveness of advisory boards. One of their main findings is that boards composed of members with close ties to the institution, such as alumni, will be more engaged in the program. One of the recommendations made by the authors is to promote a certain engagement between board members and students in activities such as final projects and social events. In their study the authors used an online survey to help understand the composition and operation of advisory boards. This survey was sent to 208 directors of 38 large engineering institutions located across the United States. 43 directors completed the survey for a low response rate of 21 percent. The survey consisted of 116 questions, which is quite high and might be the reason behind the low response rate. The survey consisted of multiple choice format questions regarding information and opinions on board operations and structure.

In Building Systems Engineering Technology board an advisory board meets on an annual basis. In this study the inevitability of this committee will be examined and the value of having graduates sitting on the advisory board will be measured.

4.2 Internships

In his study Tener (1996) describes the nature and features of the cooperation between the Purdue University Construction Engineering and Management program and the construction industry it serves. Three of the main areas of an industry-university partnership are described as industry advisory committees, a student internship program and faculty industrial experience in the industry. In this program the students are required to perform a 12 week internship in the industry. The internships are organized by a tenured teacher who placed students in the firms based on the firm's characteristics and needs and corresponding to the student's aptitudes and goals. Tener adds that there are extraordinary benefits of these internships to every part involved. Whether for the student, the industry or the university it is inarguable that a well organized industry-university partnered internship is beneficial.

In their final semester, the Building Systems students are required to do an internship of two half days a week (generally Tuesday & Friday mornings) over a 15-week period starting towards the end of January in a Private or Public Sector Company. Our study will use Tener's ideas and suggestions about the effectiveness of internships. The suitability of the format of the internship course will be investigated. The advantages of having a graduate supervise a student will also be looked at.

4.3 Final Projects

Roberth and Spencer (2005) identify the required elements of a successful capstone course. The main element is identified as seeking input from stakeholders. University-Industry partnerships can improve the relevancy and educational value of the course. Industry involvement in the educational process can be very helpful in meeting this requirement. This study discusses be advantageous if a member of the involved company has close ties to the program. To assess student satisfaction with the course, alumni was surveyed. The course usefulness was ranked in separate groups. Alumni having graduated 3 years ago, 6 years ago, 9 years ago and 12 plus years. The

students were asked to answer on a scale of 1 (Not useful) to 5 (Very Useful) the following question: “In your career, how useful have the following courses been to you?” The course received the highest rating of all courses offered by the department and this in each year bracket. Very little information was provided regarding the surveying process itself.

Currently in the B.S.E.T. program there is a final project given in a classroom setting in the very last semester. The final project course is not currently done hand in hand with the industry. It would be interesting to evaluate the feasibility of having a real project designed by our students for a consulting engineering office or a design build contractor. Both the current students and graduates will be surveyed to determine the level of interest in integrating an industry partnered capstone course in the Building Systems Engineering Technology program.

4.4 Field Trips

Students must have a strong sense of ownership towards field trips in order to engage fully (McLoughlin, 2004). Students must be engaged before the field trip, during the field trip and upon completion of the field trip. According to McLoughlin, one way of engaging the students before the field trip is to give a presentation of the activities in which the students will be engaged. Ideally this introduction could be given by a graduate of the program as this could very well increase the level of ownership of the students towards the activity. Lei (2010), presents the benefits and drawbacks when bringing students on field trips. The perspectives of both the teacher and students are examined. From the teachers perspective field trips are a key teaching tool. Field trips are the practical method of extending the class beyond the classroom walls. “From a student’s perspective field experiences enhance synthesis of information, cognitive reasoning ability, self-confidence, self-efficacy, and research collaboration skill” (Lei, 2010). Lei discusses the drawbacks of field trips such as financial matters, planning, overlapping other courses and more, but then discusses the possibility of doing on campus field trips to cut down these drawbacks significantly.

The students of B.S.E.T. are taken on field trips to engage them in the real world and to witness what they are learning on something a little larger than a 17" screen. On average the students during their three year stay in the program, go on five field trips. Lei's research on on-site campus field trips is something that needs to be investigated at Vanier College.

4.5 Guest Speaking

In their study, Zorek, Katz and Popovichm, (2011) evaluate the impact guest speakers have on student development in a professional development seminar series. 18 guests spoke over a 5 semester period. To assess the impact these guest speakers had on the students' professional development a 28 item survey instrument was distributed to 68 students. Out of the 68 students, 46 completed the survey for a 68% response rate. The results indicated a certain value of having speakers, mostly in the areas of career development and professional responsibility. There was a positive impact on the students' awareness of career options and professional development.

Occasionally in B.S.E.T. guest speakers come to present new technologies to students in the classroom setting. In some cases it is a graduate presenting, and in those circumstances the graduate is often asked to talk about their career and to explain what lead them to where they are. This can be beneficial to the current student. Often the student portrays himself in the graduate's shoes. The survey that was sent out to students inquired about the desire to have more guest speakers coming to the college and if they believe that having a graduate would be a plus value. This survey was also sent to graduates to determine the level of interest of involvement in such an area.

4.6 Alumni Satisfaction

Although it does not fit in any of the five areas of involvement described specifically, Gaier (2005) investigates the relationship between alumni satisfaction with undergraduate experience and subsequent involvement as alumni. His hypothesis

was that the higher the academic satisfaction, the most likely it is for alumni to give/participate within three years of graduation. Our research will not focus on the "giving" part of Gaier's research, but will center on the "participation" aspect. Gaier's main finding was that alumni satisfied with academic experience are more likely to be involved with the university. To conduct the research surveys were sent to 3397 randomly selected graduates. 1608 surveys were returned resulting in a 47.3% response rate. A total of 17 different variables were analyzed to determine that a relationship did exist, as hypothesised and was stated to be "for the most part" significant.

Gaier focused on the relationship between academic satisfaction and alumni involvement. Genheimer and Shenab find that member on advisory boards having close ties to the institution, such as alumni; will be more engaged and that having a high percentage of alumni on the board bears no negative impact. For final projects, Robert and Spencer mention that it can be advantageous if a member of the involved company has close ties to the program, (graduates). This brings us back to the benefits of having graduates involved in academic programs.

5 RESEARCH QUESTIONS

In this research project, the present level and present categories of alumni involvement in the Building Systems Engineering Technology program will be examined to see whether the students are being well served. The general research question will investigate how alumni involvement can help create a program for BSET students that is current in content, which motivates students, and promotes an exciting learning environment.

Four specific questions will be examined:

- *Are all five areas of involvement equally important to present day students and to the alumni?*

- *Which area of involvement motivates the students the most?*

- *Which area of involvement motivated the alumni the most in their student years?*

- *What are the main differences between the alumni and current students' perceptions about the present level of alumni involvement?*

CHAPTER FOUR
METHODOLOGY

1 INTRODUCTION

This is a case study designed to examine the perceptions of students and alumni regarding the various types of alumni involvement in the B.S.E.T. program. The study employs a cross-sectional survey design. It does not attempt to establish causal relationships, but helps to describe whether and to what degree alumni involvement benefits our students in B.S.E.T. Several variables are examined, such as: academic satisfaction and alumni involvement; graduation year and academic satisfaction; graduation year and alumni involvement. The study also examines areas such as the factors motivating the graduates to stay involved; areas where it is crucial for alumni to stay involved; desire to partner in a capstone project and area of involvement that tends to motivate students the most and that the graduates find of upmost importance.

2 POPULATION AND SAMPLE

The survey targets the second year and third year students of the building systems engineering technology program. There are 25 second year students surveyed and 19 third year students. B.S.E.T. being a three year career-oriented program, years two and three will be examined independently. For the alumni, a sample of 31 students is targeted. It is a convenience sample. It would have been very convenient to target alumni who are involved in the program, but this would have obviously affected the results. For the group of alumni the main feature which is looked at is the graduation year. The sample had to be spread out over the years. The target was to reach graduates in a format such as presented in the following table:

Table 1
Alumni to be surveyed based on graduation year

Graduation Year	# of Alumni to be Surveyed
Beginning-1990	10
1991-2000	5
2001-2010	5
2011-2013	10

3 INSTRUMENTS

Data were collected from questionnaires to measure the above mentioned aspects. Different questionnaires were sent to two groups, current B.S.E.T. students and B.S.E.T. graduates. The questionnaires were sent at the beginning of the winter semester of the 2013/2014 academic year. Most of the questions in the survey were closed-ended items for the respondents. A few questions required responses that were open- ended. The first few questions collect demographic information such as graduation year and type of employment. The students and graduates received different surveys, in that some of the questions were different. However, every important variable in the study appeared in both questionnaires in order to perform cross-examination. The surveys were sent electronically to the graduates, using Google Quizzes. The Student and Alumni questionnaires were built by the author. It would have helped to use a standardized questionnaire which had been tested for validity and reliability, but in this area of alumni involvement, appropriate questionnaires were difficult to find. Prior to sending the surveys a phone call was made to the participants, to explain the purpose of the study and to request support. The questions were largely of multiple-choice format; however a few questions were open-ended. For the students, the survey was sent using Synchron-Eyes, classroom management software. This was used for convenience purposes, as students have access to this software at their work stations in class.

4 DATA ANALYSIS

Data collection was made possible by electronic tabulation; data analysis required examining associations between variables. Associations between variables are examined. Descriptive statistics have been used, such as frequency tables and graphs. Finally crosstabs are used to perform cross-examination of students/graduates and for verifying different variables. Two open ended questions were asked, and these have been content analyzed using coding. The responses from first year students, second year students and alumni responses have been independently examined. The responses were carefully categorized. The two open ended questions were about program satisfaction and what field of alumni involvement motivated them the most. We also examined if there were important differences in how the alumni and students viewed the various activities of alumni involvement.

5 ETHICAL ISSUES

This research proposal was presented to Vanier College's Research Ethics Committee. Before commencing, the subjects filled out a written consent and were evidently permitted to withdraw from the research process at any point. All subjects filling out the surveys were ensured confidentiality. The written consent forms are kept under lock and key. The responses collected from the students are stored electronically on an external hard drive which is also kept under lock and key. Both the consent forms and responses will be kept for a period of one year and will then be destroyed.

CHAPTER FIVE
PRESENTATION AND DISCUSSION OF FINDINGS

1 FEATURES OF THE SAMPLE

During the 2013/2014 academic year, there were 86 students attending classes in the building systems engineering technology three-year program. Of the 86 students, there were 37 first year students, 25 second year students and 19 students registered in the graduating class. A total of 5 students were still registered in the program finishing their general education courses, which are courses common to students of all programs across the college. Our research targeted the second and third year students, who have all returned the survey which was distributed to them electronically in class. Amongst the second year students, there are 4 females and there were only 2 female students in the third year of the program. Women therefore represent 13.6% of the student population surveyed. There has always been an imbalance in gender in our program, being largely dominated by males year after year.

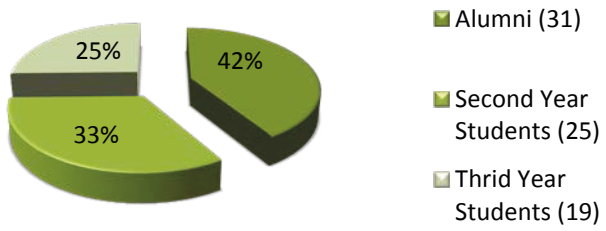

Figure 1 Sample distribution

The third portion of the sample is occupied by alumni. An electronic survey was sent by e-mail to 40 graduates from the program who we are calling “alumni” from various graduating years. 31 of the 40 students returned the electronic survey for a response rate of 77.5%. The majority of alumni who responded were males,

only two out of the 31 graduates who responded were females. The initial objective was to reach out to 30 alumni from different graduating years, 10 before 1990, five from 1991 to 2000, 5 from 2001 to 2010 and 10 from 2010 to 2014. The target for the total number of alumni was reached, however the response rate from students from recent years was higher than anticipated and the response rate of students from 1990 and earlier was lower than anticipated.

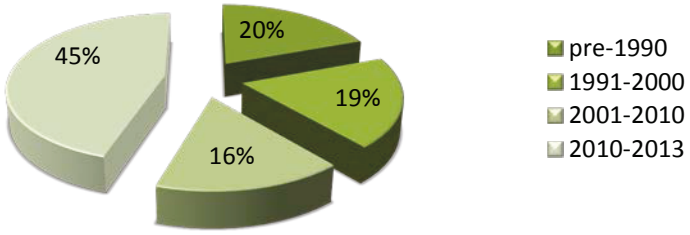

Figure 2 Alumni distribution per graduation year

The next question asked the students about their participation in various activities such as field trips, guest lectures, and internships. We can see from the chart below that the second year students have not yet participated in the internship process whereas the third year students have. All of the third year students have participated in the internship and went on a minimum of one field trip and 16 of the 19 third year students were present for a technical guest lecturing session. For the second year students only one student out of the 25 respondents had not been on a field trip and 72% of the third years have attended a technical guest lecturing session.

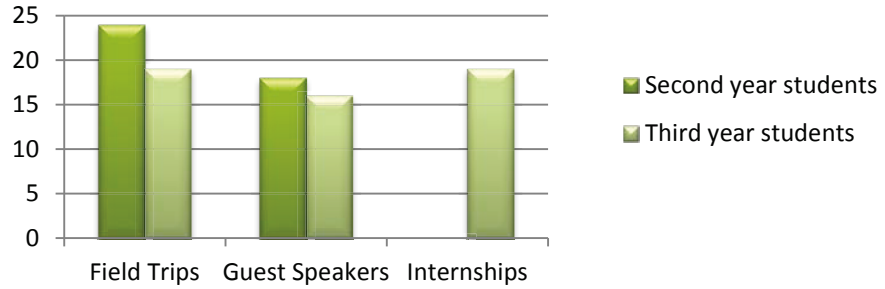

Figure 3 Student Participation

Similarly to the students, the respondents who have graduated from the program, the alumni were asked about their participation in the various activities during their student years. 87% of the graduates went on at least one field trip when they were students and 71% of the graduates attended a guest lecture session as a student. 55% of the graduates who have responded had an internship course as a student; this low percentage can be explained due to the fact that the internship course was only established in 2004.

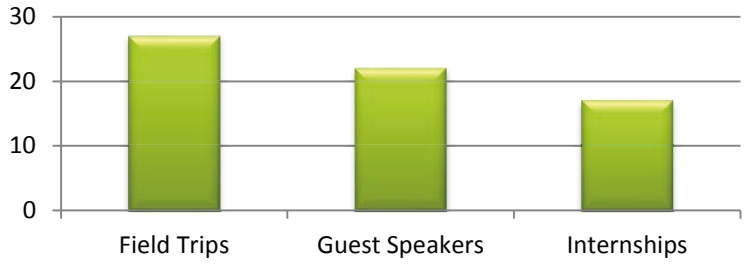

Figure 4 Participation of Alumni during their student years

Finally the alumni respondents were asked in which area of involvement they had contributed to the program activities as graduates, with BSET students. 71% of the graduates contributed to the program by participating in a minimum of one activity. The chart below illustrates the number of graduates involved in each of the four main activities: field trips, advisory board committee, internships and guest

lecturing. In the chart below, a single graduate may be involved in more than one activity.

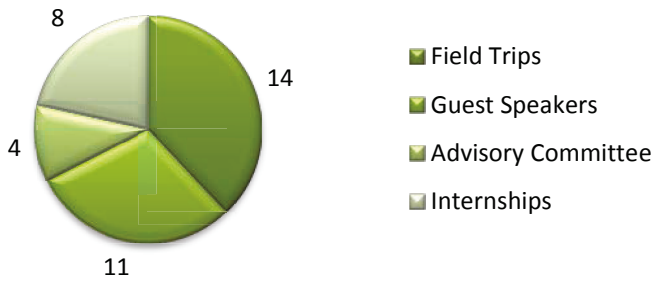

Figure 5 Number of alumni

9 graduates have not participated in any of the various activities presented. 9 have participated in one activity and 13 have participated in 2 activities or more as represented in the graph below.

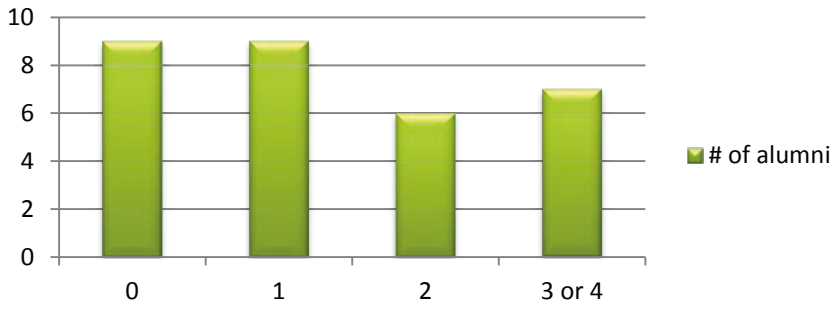

Figure 6 Number of different involvement activities

The table below demonstrates the overall satisfaction of students and graduates in regards to the building systems engineering technology program. 96.77% of graduates surveyed rate their satisfaction as good or very good, where this score was lower for students at 79.55%. Eight students have rated their satisfaction as “fair”. There is no significant difference when comparing the satisfaction levels of second and third year

students. These responses should be interpreted with a certain degree of caution since they are based on self-reporting.

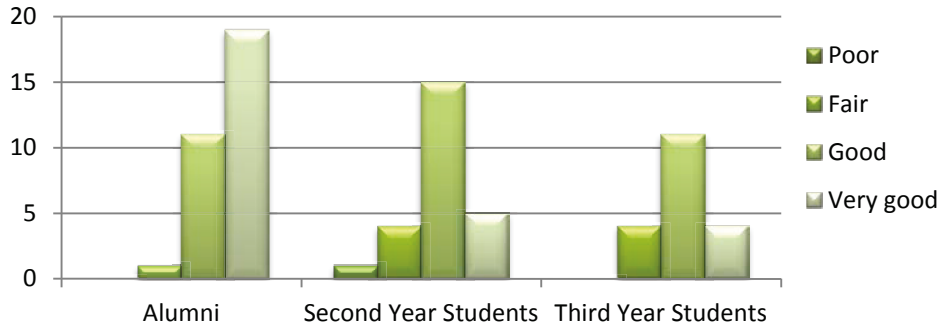

Figure 7 Program Satisfaction

2 PRESENTATION AND ANALYSIS OF DATA

2.1 Data analysis with reference to research questions

We now move to analyzing the data gathered from the survey responses in relation to the research questions that were posed earlier. The main research question was whether students in the BSET program are well served by the present level and present categories of alumni involvement? The data will be examined in relation to the four specific research questions.

2.1.1 *In which described category of involvement do students and alumni believe the presence of alumni is of upmost importance?*

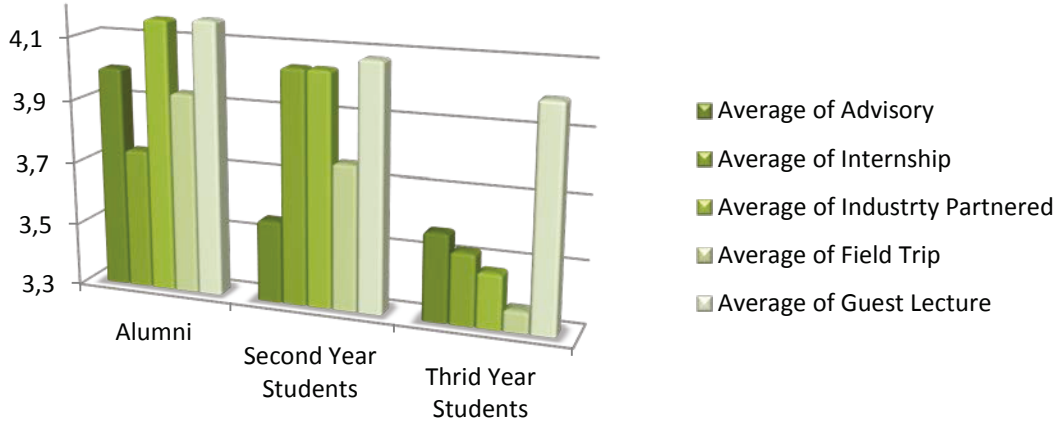

Figure 8 Importance of Alumni Involvement in Various Fields

If we are to study alumni involvement, it is important to verify when students and graduates believe the presence and participation of a student who has graduated from the program is essential. We will begin by looking at the field that stands out amongst second year students, third year students and graduates. The program often receives guest lecturers from the industry. These lectures can sometimes be graduates and other times not. Guest lecturing ranks first amongst those surveyed, the students and graduates both believe that when a person from the industry comes to present them new technologies and/or design procedures at the college it is of utmost importance that this person has graduated from the program. This is even more noticeable when looking at the third year students' results. Having invited guest lecturers quite often, I have noticed that when this lecturer is a graduate the students seem more interested, more involved. They often portray themselves in the future and ask very relevant questions. The questions are not necessarily geared towards the technology or design procedures presented but are very often focused on the profession of the lecturer. The students, who are steps away from working in the industry, want to know what their lives will be like when they transition from school to work. Some questions, they might ask are: "Do you really use all of the formulas and design methods that we learn?"; "How many

hours a week do you work?" and, yes, the occasional "How much money do you earn in a year?" which obviously almost always creates a moment of discomfort.

The next noticeable item is that advisory board ranks high when surveying graduates but not so much when looking at the second years and third years. This was to be expected as graduates might understand better the need of having the industry involved in some of the decisions we take as a program. The very fact that the advisory board member went through the three years of study in the program increases his level of understanding of the overall program approach.

Finally we can notice that the responses from all three bodies, second year students, third year students and alumni, differ and follow no evident pattern. All groups are at very different stages, even if the second year students and third year students are separated by a single year, the third year students have participated in the internship while the second years have not and the third years were exposed to a greater amount of guest lecturing and field trips which might explain the difference in their results. Having worked in the industry, the graduates might have a better picture of industry partnered projects and advisory boards and therefore have ranked the importance of alumni involvement higher in those categories.

2.1.2 *Which areas of involvement motivate students the most?*

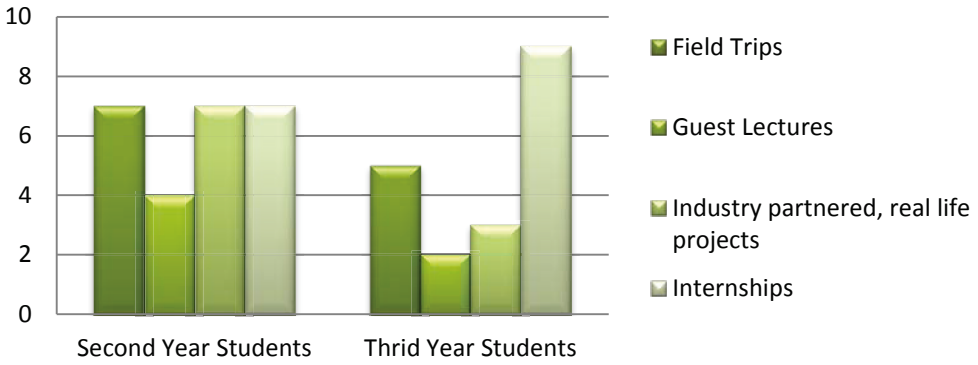

Figure 9 Student motivation towards areas of alumni involvement

When looking at the bar charts above we notice that for second year students there is no significant area of motivation that stands out. However fewer students are motivated most by guest lecturing. This is also noticeable with third year students. The answer to this might be that students want to get out of the classroom walls and see the real deal. They want to see the heating, ventilation and air conditioning (HVAC) installations installed and running, not on wheels. As seen previously, the students believe it is very important for guest lecturers to be graduates; however the students are not most motivated by guest-speaking sessions. We will now look at each category of involvement independently and see why the students are motivated by each one.

Field Trips:

> *"Being able to experience the course content on a field trip will give me a firsthand look at what it is exactly I will be doing in the future. It gives me a better understanding of the field and what is involved in it", second year student*
>
> *"Great to see the real world in the beginning semesters", second year student*
>
> *"Field trips allow students to get to see real life applications for HVAC equipment. They help the students realize that what they are studying in school is used in the real world", third year student*
>
> *"It gives us a clear perspective of our program and an idea of future job", third year student*

Many students responded in a similar way to the above comments. Some students indicated the importance of having field trips scheduled in the early semesters at the start of the 3 year program; this is not something that will be overlooked. In their early semesters the students focus on general education and theoretical courses, which leaves little place for tangible experiences, occasional field trips could help remedy this situation. Other students relate field trips to the real world, and to their future jobs.

This increased motivation can only help better the student's overall academic performance and could also help with student retention during the first year of the program. When isolating the third year students we can notice that internships stands out as most motivating The third year students had answered the survey a few days after completing their internship. The high level of motivation is an indicator of success of the internship.

Guest Lectures:

> *"Because hearing from someone who has graduated motivates me by seeing what I can do after I graduate and where I could possibly end up", second year student*
>
> *"It makes students understand what they'll be dealing with in the nearby future and gives us students to realize and think about what type of industry or we'll be interested in.", second year student*
>
> *"It makes me think about life and one day maybe I'll be the one motivating students", third year student*

As we have seen before, guest lecturing ranked first when students were asked about the importance of alumni involvement and last when asked about motivation levels. The students who are most enthusiastic with guest lecturing gave some pretty interesting comments as seen above. From the comments we can see that the students identify themselves to the guest lecturer, they portray themselves in their shoes. I believe this may very well encourage the students to go on, and can have an impact on improving their speaking skills and confidence.

Internships:

> *"Learn valuable life lessons", second year student*
>
> *"Break the ice", second year student*
>
> *"We get the chance to witness and put into practice what we are being taught at school", third year student*
>
> *"The internship allows for actual in the field experience with similar contexts as if graduated and looking for a job", third year student*

The students who have chosen internships as being the most motivating area of involvement have done so because they see it as the final stepping block towards the industry. It gives them the opportunity to put into practice what they have learned in school in the real world, and because it may very well bring them toward their very first career opportunity.

Industry Partnered Projects:

> *"It would help would put me directly in the area of work where I could feel the pressure of the real life project and when I would graduate I would be able to understand how important is the industry", second year student*
>
> *"Real life projects gives you not only a clear image of what the work atmosphere and responsibilities will be but also if you love doing it or if you need to find another field that motivates you more", second year student*
>
> *"This motivates me because it is a project that professionals in the field are working on and based on my knowledge I feel that I would be able to aid the project or add a benefit to it. Also it would set us up for what the real work force has to offer and we know what to expect when we leave the course", third year student*
>
> *"Because we feel as though we are a part of an important project something that actually is being used in the real world", third year student*

Although industry partnered projects are not yet part of the curriculum in BSET a total of 10 students have ranked this at the top of their list in regards to motivation. The students have made some strong arguments for the incorporation of industry partnered projects such as learning to cope with pressure in real life situations and to contribute to the real world. In an exam when a student makes a minor mistake, like a typo on a calculator, they might lose 5% of their grade, but in the real world if you apply 1% profit instead of 10%, this is a big deal.

2.1.3 *Which areas of involvement motivated alumni most in students' years?*

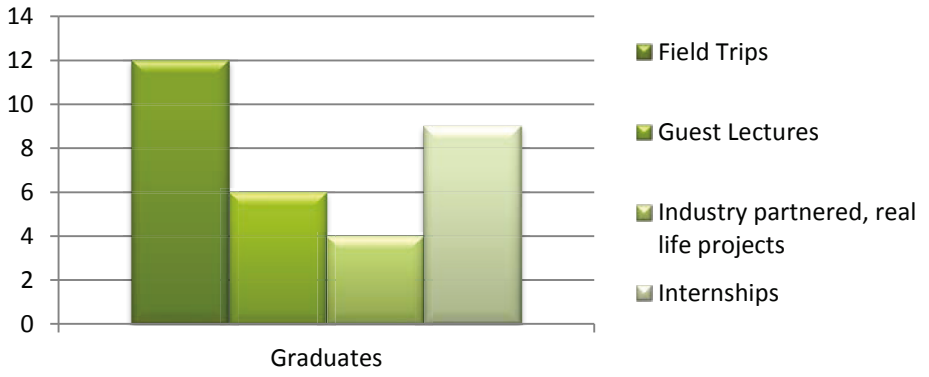

Figure 10 Alumni field of motivation

Similarly to the third year students, internships and field trips stand out when the graduates are asked about the field of involvement that motivates them the most. Below we will see some interesting comments from the alumni.

Guest Speaking

> *"Our class (1976) did not have field trips at the time, we only had guest speakers to speak about their products/projects and experience which was very valuable"*

> *"At the time I wasn't a serious student and having guest speakers from BSET graduates really made an impact on me to realize how important it is to take action and seize the career you want"*

Here we observe that there were no field trips in the early years of the program and that having guest speakers come to class was of great value. The second comment addresses the fact that sometimes, guest speakers may actually influence the career path students may take.

Field Trips

> *"This is one of only 2 involvements in which I participated and seeing real life installations was more motivating than someone speaking about them"*
>
> *"I believe the field trips to be most motivating because you can see what you are doing in the field of work. You can better gauge where you would like to be in the future and work for that goal"*

Similarly to the previous comments on guest speaking, the graduates mention that a field trip might help current students determine what they want to do in the future. We also observe that a graduate believes that it is more motivating to see real life installations in comparison to hearing about them through guest lecturing.

Industry partnered project

> *"There's no better way to demonstrate your acquired knowledge and apply it in a real work context. Real life projects provide an outlook on what would be expected of the students once they're out in industry"*
>
> *"To be able to differentiate between real life problems and theoretical problems"*

The Building Systems Engineering Technology program does not as of yet have industry partnered projects but the comments made previously by students and above by graduates indicate that this type of project can bring some up to date and concrete theoretical and practical knowledge to the students.

Internships

> *"I was able to decide what branch of BSET would be best suited for me and whether I would prefer to work out in the field or in an office"*

> *"The internship was the best way to easily and efficiently find a job at the program. It can also help students decide whether or not working right-away or going to university is what they want to do" internship*

Both comments are very interesting; we can see how internships had a significant impact on the career choices of these two students. The first said that the internship helped him decide if he wants to work in an office or in the field. Some students come in our program with the misconception that they will be trained to be plumbers, sheet metal workers or electricians. This is not the case, we teach them to become designers, draftsmen and project managers. However some careers lead to office work, and others to field work and the internship seems to be an appropriate place to sort out what the students want to do to start their careers off. The second student identified the internship as a potential place to figure out if they want to work right away or head off to university. This is also a dilemma many of our students face when they are almost done with their college studies.

2.1.4 *What are the main differences between student and graduate responses?*

As seen previously, the second year students, the third year students and the alumni were asked which field of alumni involvement motivated them the most. The open ended question asking them why they feel this way was content analyzed using a coding system. Each response was coded and categorized into three different groups. The first group consists of responses that indicate that the subject is motivated because the item of motivation entails real life experiences. The second group contains responses that are geared towards careers and to the field of work. The last category includes responses that discuss knowledge both theoretical and practical.

Table 2

Motivational reasoning per group

	Real Life	Career	Knowledge
Second Years	43.48%	30.43%	26.09%
Third Years	38.89%	27.78%	33.33%
Alumni	35.71%	42.86%	21.43%

The above table demonstrates that the alumni's motivational reasoning is career oriented. 42.86% of the subjects' comments consisted of remarks that discussed careers, field of work, and job opportunities. The motivational reasoning for both groups of students is more oriented towards realistic life experiences and what to expect in the future. 43.48% of second year students and 38.89% of third year students made remarks about real life expectations. This does not come as a surprise, but is none the less very interesting. The alumni are already involved in their careers, they are in the industry therefore more inclined to be motivated by this aspect. The students on the other hand are anxious to be in the real world, outside the classroom walls and want to see what they are studding in a genuine environment.

The subjects were asked to rate their overall satisfaction with the program, and why. These responses were also content analyzed using a coding system. Again, each response was carefully distributed amongst three categories. The first category involves responses that deal with the course curriculum. The second category contains responses that are career oriented and field of work, for example if the student's answer is related to his future after school, his response would be categorized in "career". Finally, the third category includes responses that involved the teachers of the B.S.E.T. program. All categories were subdivided into positive and negative comments, as represented in the following table.

Table 3
Categorized positive/negative comments per group

Group	Curriculum		Career		Teachers	
	Positive	Negative	Positive	Negative	Positive	Negative
Second Years	26.32%	10.53%	26.32%	0.00%	21.05%	15.79%
Third Years	50.00%	18.75%	12.25%	0.00%	6.25%	12.50%
Alumni	40.74%	14.81%	29.63%	0.00%	7.41%	7.41%

Looking at the above table we can notice that the program satisfaction comments oriented towards careers and field of work are all positive. This is very interesting, as the main purpose of a career oriented program like Building Systems Engineering Technology is to prepare students for work. We can see that the ratio of positive over negative comments related to curriculum is almost identical for all three groups. On an average, there are 2.63 times more positive comments than negative when it comes to course content.

Table 4
Crosstabulation : The three groups in relation to the importance placed by each on the type of alumni involvement

			Field Trips	Guest Speaking	Industry Partnered	Internship	Total
Type of	Alumni	%within	38.7%	19.4%	12.9%	29.0%	100%
	Second years	%within	32.0%	16.0%	28.0%	24.0%	100%
	Third Years	%within	26.3%	10.5%	15.8%	47.4%	100%
Total		%within	33.3%	16.0%	18.7%	32.0%	100%

The table shows some differences between the responses of alumni and the second and third year students. For alumni, field work seems to be most important and industry partnerships least important. The second year students also opt for field work as being most important. However, the third year group single out internships as most important. The second year students had not yet completed an internship when they

completed the survey, whereas the third years have. This might be why the internship comes out very strong with the third year students. A chi- square test confirmed that the small association detected between the type of involvement and the three groups is not statistically significant. ($p > 0.05$).

CHAPTER SIX
CONCLUSIONS, LIMITATIONS AND SUGGESTIONS FOR FUTURE REASEARCH

1 MAIN CONCLUSIONS

This project focused on the fact that it is a challenging task for full time technology educators to stay current with regards to latest industry trends. This paper has put forth the argument that alumni involvement is a key element in providing support to these educators when facing this difficult challenge.

On the basis of the evidence gathered from the suverys, it seems that both the alumni and current students of the building systems engineering technology program feel that it is of utmost importance that the alumni are involved in the Program. The survey results show that the guest lecture is perceived as being one of the most important when considering types of alumini involvement. This seems to be of particular importance when a guest lecturer comes to present new technologies and design procedures to students, and this person has graduated from the program. Analyzing the comments from the students we can see that the students identify themselves with the guest lecturer, they portray themselves as being in his/her shoes in future years. Students seem to perceive this as having a positive impact on their speaking skills and overall confidence. Emphasis should be put on requesting help from alumni when bringing in guest speakers, the students and graduates have demonstrated in their responses that this is of essence. These sessions should take place every semester as opposed to being condensed in the final year of the program, which is the current situation in the program.

What is interesting is that although it ranks highest in terms of alumni involvement importance, guest lecturing is the area that does not seem to motivate the students as much as field trips and internships. This may seem as a contradiction at first. However, after analysing the student's responses, one would argue that the

reason for this is that the students want to go beyond the classroom walls. The field trips and the internships – project based learning - are what motivate the students and alumni most in their student years. One could therefore look at alumni involvement in various areas as a continuum over the three year program, starting with guest lecturing and then moving to the areas of field trips and internships. The proportion of third year students that selected the internship as most motivating is an indicator of success of the internship as they answered the survey just a few days after completing their sixth semester internship. It would be interesting to study the impact of having alumni involved in the internship process, for example interviews and supervision. These graduates have a clear understanding of what the students learn and could be better suited than a non-graduate when assigning tasks to the students during their internship.

Many students mentioned that it would be important to participate in the field trips in the earlier semesters of the six semester program; this has already been brought to the attention of the program. At the college, two recent graduates from B.S.E.T. have been recently hired to work in the facilities department. It would be great to involve these graduates in providing our students guidance during on-campus field trips.

The responses indicate that it would be of essence to have graduates meet the students in the very first semester for guest speaking sessions and field trips. These findings will help our department immensely. We now know the importance of having alumni involved in guest lectures, however, the present level of guest speaking sessions should remain constant, in part as it is not most motivating to students, but should be held more consistently throughout the program. Currently there are many guest speaking sessions during the final semesters; they should be distributed evenly throughout the three years of the program. The number of field trips however should be increased, especially in the early semesters. The literature points out that having the students involved before, during and after the field trip can be beneficial. This is something that is not always done in the program. It will be suggested to the department to have the students involved in the selection of the field trips, in the

questions prepared to ask the site visit guide, and in various activities post field trip. It would be beneficial to have the students communicate with the participating alumni in the organization of various program activities.

One noticeable item is that the advisory board ranked higher (than the students ranking) when surveying alumni in terms of importance of alumni involvement. This was expected as the alumni have a better understanding of this body as they are industry workers, and might understand the need of having the industry involved in some of the decisions taken at the program level. The literature mentioned the importance of having alumni boards composed of members with close ties to the institutions, such as alumni. Alumni involvement on advisory boards will result in a more engaged body. Currently almost every single advisory board member for building systems engineering technology is an alumni and this should be maintained.

The literature demonstrated that the motivation level of students increases as the content of curriculum is geared to real life. Having the students involved in real life situations during their student years might better prepare them to cope with the pressure that is present in the industry. The content analysis of open ended questions brought out, once more, the importance that students place on real life situations, what in the literature is called Project Based Learning. Students are looking closely at what is expected from them in the future when they move into the labour market.

As of yet the building systems engineering technology program does not have any industry partnered projects, but I believed it was important to include this as one of the categories of involvement. This was a good decision as 10 of the 44 students ranked this at the top of their list in regards to motivation. Some of the open ended comments indicate that this type of project can bring some up to date and concrete theoretical and practical knowledge to the students. It will be recommended to the department to start a committee to examine how industry partnered projects can be introduced in the program.

2 LIMITATIONS OF THE STUDY

This survey research involved 31 graduates, 25 second year students and 19 third year students. Although the sample of students was fairly representative of the student body in the program, it remains a small sample. Due to this small sample size, the study is somewhat limited. Face-to-face interviews with a few students and alumni could have enabled one to collect more information and probe further. At this stage it should be pointed out that members of the the faculty of the program could have also been surveyed, or even interviewed. This could have brought a different perspective to the responses, and could have also raised different questions to explore.

3 SUGGESTIONS FOR FUTURE RESEARCH ON THE SUBJECT

The building systems engineering technology program on its own is relatively small, it would be beneficial to perhaps look at other career programs that focus mainly on technology. This could bring different point of views, from different industries. It would be interesting to find out whether other technology oriented career programs also have alumni involvement. Further, it would be interesting to see a similar study performed in the various regions of the Province, to see if alumni involvement is perceived as being as important in the regions in comparison to the region of Montreal.

In ending, we emphasise once more that without a clear link between teachers in the program and Industry it is impossible to prepare the students adequately for their future career in College Career Programs that are dominated by technology. The alumni might just be that glue that links the industry and program together.

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Appendix A

Student and Graduate Questionnaires

Appendix B

Consent Waiver Form